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| ROBERT A. KENT P.O. BOX 1431 DUNCAN, OK 73536 | | | EXAMINER GEDRESILASSIE, KTBROM K | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/728,295

Applicant(s)

SOLIMAN ET AL.

Examiner

KIBROM K. GEBRESILASSIE

Art Unit

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 April 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SF/ICE)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. This communication is responsive to amended application filed on 04/16/2008.
2. Claims 1-29 are presented for examination.

Response to Arguments

3. Applicants are thanked for amendments/Remarks.
4. Applicant's amendment to claim 24 relating to claim objection is considered and therefore the objection is withdrawn.
5. Applicant's argument relating to 101 rejections is not persuasive. The claim as a whole is just an abstract idea, which is a mathematical construction of a model and therefore the claims do not require any physical transformation and the invention as claimed do not produce a useful, concrete, and tangible result.

Further, there is no requirement that the stresses are caused by the person. If so, then it is mere scientific geological study.

6. Applicant's argument relating to 112, second paragraph, rejection is persuasive for claims 1, 18, and 24. However, the argument relating to claims 2, 19, and 25 are not persuasive for the following reasons:

- a. For example, claim 2 recites:

2. (Original) The method according to claim 1, wherein steps (a), (b), and (c) are performed prior to creating any of the fractures in the subterranean formation.

There is a clear indication that creation of a fracture before the steps are performed. The question is how and when the fracture created before steps are performed. Therefore, it is proper to reject the claims under 112 for being vague

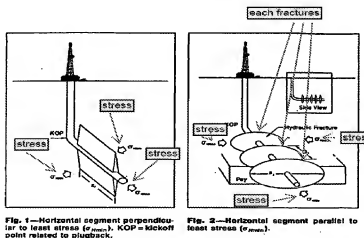
Art Unit: 2128

and indefinite and further for missing steps of "creating a fracture" before the steps are performed. For this reason, the rejection is maintained.

7. Applicant's arguments relating to art rejection is not persuasive. The prior art clearly has stress/fracture calculations. Applicants have not provided any explanation, how the claims are functionally or patentably distinct from the prior art. Applicants appear to infer more explicit definitions into the claims than are actually recited.

b. For example, applicants argued that the prior art of reference fails to disclose *determining one or more geomechanical stresses induced by each fracture based on the dimension and location of each fracture.*

In Figures 1 and 2 stresses are induced by each fractures based on the dimensions and location of each fractures.



Where,

σ_{Hmax} = maximum horizontal stress,
psi
 σ_{Hmin} = minimum horizontal stress,
psi
 σ_f = closure stress at initiation
zone, psi
 σ_a = closure stress at fracture tip,

- c. Further, Applicants argued that the prior art fails to disclose *determining maximum number of fractures based on the geomechanical stresses induced by each of the fractures.*

For example, the prior art teaches:

Fig. 13 shows that, initially, total flow rate increases as the number of fractures increases. The total flow rate reaches a maximum, and then it declines. The number of fractures at which the maximum flow rate occurs declines with time, reaching five fractures after 1 month but declining to only two fractures after 24 months. The decline in total flow rate is caused by reservoir depletion. The optimum number of fractures is better determined from Figs. 14 and 15, which show that, for the case under consideration, five fractures represent the optimum number of fractures necessary to produce the reservoir. This number may vary if economic considerations are included. Note that the optimum number of fractures depends on formation and fluid properties.

As recited above, the prior art discloses the maximum number of fracture (i.e. five fractures) determined by the maximum flow rate because the total flow rate increases as the number of fracture increases. It is also known that if there is a flow, there is stress. Therefore, when the flow rate reaches maximum (i.e. related directly/indirectly to stress), the number of

fracture is also reach maximum (i.e. five fractures). Therefore, the recited limitation is disclosed in the above recited portion of the prior art.

Specification

8. The disclosure is objected to because of the following informalities:

Specification recites:

[0036] Referring now to Figure 5, step 302 of Figure 3, in which the method according to the present invention determines the geomechanical maximum number of fractures, is shown in

Step 302 of Figure 3 determines *Cost Effective Number of Fracture*, but not *Geomechanical Maximum Number of Fractures* as seen in step 304. Therefore, step 302 should be replaced with step 304.

Appropriate correction is required.

Claim Rejections - 35 USC § 101

9. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

10. Claims 1-29 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter since the claims as a whole do not provide a physical transformation or a useful, tangible, and concrete result. Claims directed to nothing more than an abstract idea, which are abstract mathematical idea (i.e. mathematical construct). A mere abstraction provides no benefit in a real world situation.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 2, 19, and 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claim 2, 19, and 25 recite "...steps (a), (b), and (c) are performed prior to creating any of the fractures....". According to the claim invention, there is a creation of fracture before the steps are performed. However, there is no any steps how and when the fractures are created. Therefore, it is proper to reject the claims under 112 for being vague and indefinite and further for missing steps of "creating a fracture" before the steps are performed.

13. Claims 2, 19, and 25 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are:

d. As per claim 2, 19, and 25, claims recite "prior to creating". According to the claim limitation, there is a creation of fractures. However, no limitation in the claims that shows how the fractures are created. Therefore, it is proper to reject the claims for being omitting an essential step of "creating a fracture".

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. Claims 1-29 are rejected under 35 U.S.C. 102(b) as being anticipated by M.Y. Soliman, J. L. Hunt, and A. M. Elrabaa, "Fracturing Aspects of Horizontal wells", (herein referred as Soliman), 1990 Society of Petroleum Engineers, pages 966-973.

16. As per Claim 1, Soliman discloses a method of optimizing a number, placement and size of fractures in a subterranean formation (See: "Summary" in page 966) comprising the steps of:

(a) determining one or more geomechanical stresses induced by each fracture based on the dimensions and location of each fracture (See: page 967, "Determining Magnitude and Orientation of Least Principal Stress" and also Figs. 1 and 2);

(b) determining a geomechanical maximum number of fractures based on the geomechanical stresses induced by each of the fractures (such as...*reaching five fractures after a month(i.e. five fractures are maximum number of fractures) but declined to only two fractures after 24 month...*;See: page 969, middle column, lines 9-13);

(c) determining a predicted stress field based on the geomechanical stresses induced by each fracture (See: page 967, "Determining Magnitude and Orientation of Least Principal Stress"); and

(d) generating an optimized number, placement and size of one or more fractures in subterranean formation (See: Figs. 15, 16, 17, table 2 and corresponding texts), where generating the optimized number, placement and size for one or more fractures in a subterranean formation is based, at least in part, one or more of:

the geomechanical maximum number of fractures (such as...*reaching five fractures after a month(i.e. five fractures are maximum number of fractures) but declined to only two fractures after 24 month...*;See: page 969, middle column, lines 9-13); and the predicted stress field based on the geomechanical stresses induced by each fracture (See: page 967, "Determining Magnitude and Orientation of Least Principal Stress").

17. As per Claim 2, Soliman discloses the method according to claim 1, wherein steps (a), (b), and (c) are performed prior to creating any of the fractures in the subterranean formation (such as ...*a simulated fracture is initiated...*; see: page 971, left side, lines 5-10).

18. As per Claim 3, Soliman discloses the method according to claim 1, further comprising the steps of: determining a cost-effective number of fractures; determining an optimum number of fractures, where the optimum number of fractures is the maximum cost-effective number of fractures that does not exceed the geomechanical maximum number of fractures (such as *determine the optimum location of the well to yield maximum exposure of the pay zone...*; See: page 970, right side, lines 15-17).

19. As per Claim 4, Soliman discloses the method according to claim 1, further comprising the step of spacing the fractures a uniform distance from each other (See: Fig. 2).

20. As per Claim 5, Soliman discloses the method according to claim 1, further comprising the step of creating the fractures with a uniform size (such as...*fractures are identical in physical dimensions....*; see: page 969, left side column, lines 3-5).

21. As per Claim 6, Soliman discloses the method according to claim 1, further comprising the steps of: creating one or more fractures in the subterranean formation; and repeating steps (a), (b), and (c) after each fracture is created (such as ...*multiple fractures may be created*...;See: "Conclusion" lines 1-3).

22. As per Claim 7, Soliman discloses the method according to claim 6, wherein the repeating step comprises the steps of gathering and analyzing real-time fracturing data for each fracture created (such as ...*an actual well was logged between*....;See: page 971, right side, lines 1-4; Table 2).

23. As per Claim 8, Soliman discloses the method according to claim 7, wherein a well is placed in the subterranean formation, the well comprising a wellhead, a tubing, and a well bore (See: fig. 2), the well bore comprising a downhole section, and wherein the gathering of real-time fracturing data comprises the steps of: (i) measuring a fracturing pressure while creating a current fracture (such as ...*the limits of the treatment pressure to achieve certain fracture growth can be determined*...;See: page 970, right side, lines 4-14); (ii) measuring a fracturing rate while creating the current fracture; and (iii) measuring a fracturing time while creating the current fracture (such as ...*the number of fractures at which the maximum flow rate occurs declines with time*...;See: page 969, middle column, lines 9-13).

24. As per Claim 9, Soliman fails expressly to disclose one or more transducers located at the wellhead. However, the limitation, one or more transducers, is deemed to be inherent to the teaching of Soliman as page 970 right side column, lines 4-14, which

shows determination of pressure. The determination of pressure will be impossible if there is no any sensing device at the wellhead in the system of Soliman.

25. As per Claim 10, Soliman fails expressly to disclose one or more transducers located at the down hole. However, the limitation, one or more transducers, is deemed to be inherent to the teaching of Soliman as page 970 right side column, lines 4-14, which shows determination of pressure. The determination of pressure will be impossible if there is no any sensing device at the down hole in the system of Soliman.

26. As per Claim 11, Soliman discloses the method according to claim 8, wherein the fracturing pressure is measured in the tubing (such as *...equation A-5 and A-6 ensure the continuous change of pressure and rate inside the fracture...*; See: Appendix A equation A-5 and A-6).

27. As per Claim 12, Soliman discloses the method according to claim 7, wherein analyzing of real-time fracturing data comprises the steps of: determining a new stress field, based on the real-time fracturing data; and comparing the new stress field with the predicted stress field (such as *an actual well with stress every 10 ff and ...simulated fracture... and comparison is done in Fig. 17*; See: page 971, left side, lines 1-15).

28. As per Claim 13, Soliman discloses the method according to claim 12, further comprising the step of decreasing the number of fractures in response to the real-time fracturing data (such as *...the number of fractures at which the maximum flow rate occurs declines with time...*; See: page 969, middle column, lines 9-13).

29. As per Claim 14, Soliman discloses the method according to claim 12, further comprising the step of increasing the distance between the fractures in response to the

real-time fracturing data (such as... *penetrate 40 ft, instead of 5ft,....*;See: page 971, left side, lines 25-37).

30. As per Claim 15, Soliman discloses the method according to claim 12, further comprising the step of adjusting the size of the fractures in response to the real-time fracturing data (such as ...*the limits of the treatment pressure to achieve certain fracture growth can be determined....*;See: page 970, right side, lines 4-14).

31. As per Claim 16, Soliman discloses the method according to claim 1, wherein the subterranean formation comprises a well bore comprising a generally vertical portion (such as ...*vertical fracture....*; see: page 967, right side column, lines 36-40; Fig. 3 *Vertical and horizontal wellbore*).

32. As per Claim 17, Soliman discloses the method according to claim 16, wherein the well bore further comprises one or more laterals (Fig. 2).

33. As per Claims 18-29, The limitations of claims 18-29 have already been discussed in the rejection of Claims 1-3, 6, 7, and 12. They are therefore rejected under the same rationale.

Conclusion

34. All claims are rejected.

35. The prior art made of record on PTO-892 and not relied upon is considered pertinent to applicant's disclosure.

36. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Examiner Remarks

37. Examiner's Note: **Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant.** Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. **It is respectfully requested from the applicant in preparing responses, to fully consider the references in their entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.**

Examiner Request

38. **In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the**

structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

MPEP states:

"...with respect to newly added or amended claims, applicant should show support in the original disclosure for the new or amended claims. See MPEP § 714.02 and § 2163.06."

Requests for Interview

39. In accordance with 37 CFR 1.133(a)(3), requests for interview must be made in advance. Interview requests are to be made by telephone (571-272-8571) or FAX (571-273-8571). Applicants must provide a detailed agenda as to what will be discussed (generic statement such as "discuss §102 rejection" or "discuss rejections of claims 1-3" may be denied interview). The detail agenda along with any proposed amendments is to be written on a PTOL-413A or a custom form and should be faxed (or emailed, subject to MPEP 713.01.I / MPEP 502.03) to the Examiner at least 3 days prior to the scheduled interview. Interview requests submitted within amendments may be denied because the Examiner was not notified, in advance, of the Applicant Initiated Interview Request and due to time constraints may not be able to review the interview request to prior to the mailing of the next Office Action.

Communications

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kibrom K. Gebresilassie whose telephone number is 571-272-8571. The examiner can normally be reached on 8:00 am - 4:30 pm Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini S. Shah can be reached on 571-272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kamini S Shah/

Supervisory Patent Examiner, Art Unit 2128

/Kibrom K Gebresilassie/
Examiner, Art Unit 2128